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Sabee et al.

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[54] SYNCHRONIZED CLUTCH

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[58] Field of Search 192/53 B, 53 R, 48.5, 192/48.7, 105 C, 105 CS

[56] References Cited

U.S. PATENT DOCUMENTS

1,250,687	12/1917	Smith	192/53 B
1,681,714	8/1928	Tullar	192/53 R
1,739,946	12/1929	Carhart	192/53 B X
1,752,062	3/1930	Carhart	192/63 B
1,755,769	4/1930	Carhart	192/53 B
2,042,356	5/1936	Nardono	192/53 R X
2,072,116	3/1937	Lewis	192/48.7 X
2,259,730	10/1941	Burnett	192/53 B X
2,319,784	5/1943	Backus	192/53 B X
3,063,529	11/1962	Cook	192/53 B X
3,161,270	12/1964	Aschauer	192/53 B X
3,252,553	5/1966	Peterson	192/53 B

3,300,004	1/1967	Peterson	192/48.5 X
3,491,863	1/1970	Karlsson et al.	192/53 R
3,547,241	12/1970	Tungate	192/53 B
3,587,799	6/1971	Chamberland	192/53 B
4,131,185	12/1978	Schall	192/53 B
4,555,003	11/1985	Phillips	192/53 B

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[57] ABSTRACT

A synchronized clutch for coupling a driven element to a drive element includes an externally activated nonpositive coupling, and a positive coupling which engages automatically when the driven element achieves a designated operational state. The nonpositive coupling, preferably comprising at least one friction element permitting some slippage between the drive and driven elements, accelerates the driven element to a velocity which at least approaches synchronization of the drive and driven elements. The positive coupling preferably comprises a sliding drive ring which is responsive to centrifugal weights to positively couple the drive and driven elements at a designated velocity. The external forces actuating the nonpositive coupling are preferably applied manually through a lever. Provision is preferably made for the automatic disengagement of the clutch when the velocity of the driven element decreases below a designated velocity.

25 Claims, 7 Drawing Sheets

